

REGULAR ORIGINAL

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## **MEDIA HOLDER HAVING COMMUNICATION CAPABILITIES**

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## **MEDIA HOLDER HAVING COMMUNICATION CAPABILITIES**

### **CROSS REFERENCE TO RELATED APPLICATIONS**

Reference is made to commonly assigned co-pending patent  
5 applications Appl. Serial No. 10/161,514 entitled "Virtual Annotation Of A  
Recording On An Archival Media" filed on 9/9/02 in the name of Kerr et al, Appl.  
Serial No. 10/256,769 entitled "Medium Having Data Storage And Communication  
Capabilities And Method For Forming Same" filed on 9/27/02 in the name of Kerr et  
al., Appl. Serial No. 10/256,824 entitled "Medium Having Data Storage And  
10 Communication Capabilities And Method For Forming Same filed on 9/27/02 in the  
name of Kerr et al. and our Docket 87158 entitled "Viewing Device" filed on  
11/19/03 in the name of Kerr et al.

### **FIELD OF THE INVENTION**

The invention generally relates to the field of information management  
15 and more particularly to the management of information that is recorded on mediums  
having radio frequency identification devices attached thereto.

### **BACKGROUND OF THE INVENTION**

Information management systems such as Hospital Information  
Systems (HIS) or Radiology Information Systems (RIS) are used to help facilitate  
20 access to and control of medical records of patients who are admitted to hospitals or  
who are receiving outpatient care. Such medical records can be in a wide variety of  
forms. Some medical records comprise handwritten notes while automatic billing,  
monitoring, and/or diagnostic systems make other records. For example, diagnostic  
images can be generated by various different types of modalities such as Computer  
25 Tomography, Ultra Sound, Magnetic Resonance Imaging, Digital Radiography, or  
Computed Radiography etc. Each type of diagnostic equipment typically records  
image data in electronic form. These electronic image data are subsequently  
presented after printing on films and papers for hardcopy. These can also be viewed  
on displays of various kinds.

30 At many medical facilities, patient records are ultimately recorded on  
disparate types of media that are physically gathered into so-called charts or folders  
that serve as the repository of medical information for each patient. It is vital for  
effective patient care that such folders contain all of the medical records associated  
with a patient. It is also vital that such folders contain only medical records that are

associated with the patient so that there is a minimal chance of confusion due to mismatched medical records. Finally it is also important that access to a patient's folder be properly maintained, with appropriate authorization and security measures established to help protect against unauthorized access to the medical records

5 contained in such folders.

Radio frequency identification tags have been proposed for use in a wide range of identification and tracking applications such as passports and credit cards, as is disclosed in U.S. Patent No. 5,528,222 to Moskowitz et al. One type of commercially available, low profile radio frequency identification tag is the "TAG-IT INLAY"™ RFID tag available from Texas Instruments, Incorporated, located in Dallas, Texas, USA. This component can be used to provide identifying information about an item to which it is attached, for example. Radio frequency identification devices are useful for tracking the location of, characteristics of and usage of documents, books, packages, and other inventory. For example, radio frequency

10 identification tags can be used to track the location of documents and track the chain of custody of such documents within a medium management system. Radio frequency identification tags offer the advantage of small size, enabling these devices to be unobtrusively attached or embedded within an item. Unlike optical or mechanical equivalents, radio frequency identification tags allow communication

15 regardless of orientation relative to a transceiver. When equipped with an on-board read-write memory, these devices can be used for recording and recall of at least some amount of data related to an item to which they are coupled.

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Systems employing radio frequency identification tags typically comprise a read/write element, or radio frequency transceiver, that acts as the

25 interface between the radio frequency identification tags and a computer system of some type that uses and/or provides the stored data. In a typical embodiment, the radio frequency identification tag takes the form of a transponder, having an integral antenna, adapted to send and receive electromagnetic fields in cooperation with the transceiver, where the electromagnetic field itself contains information to be

30 conveyed to and from a memory on the radio frequency identification tags. Radio frequency identification tags having both read/write and read-only versions of radio frequency identification tags are available. Information that is stored using a memory in a read/write type of transponder on the radio frequency identification tags can be used to track, identify, and process an item. Such a read-write radio frequency

identification tag can also store other information that is to be associated with the item, such as timestamps and identification codes for example.

However, radio frequency tags of the type that are typically associated with a medium such as a diagnostic image or other medical record typically have only a limited range of communication and while they can effectively communicate over a near distance proximate to the radio frequency tag, they cannot send and receive information over convenient distances greater than the near distance. This makes it inconvenient to track the movement of files and folders using conventional radio frequency tag technology.

Thus, it can be seen that there is a need for a means for tracking, and management of medical records that are stored in diagnostic files.

#### **SUMMARY OF THE INVENTION**

In a first aspect of the invention a holder is provided for holding at least one medium, with the at least one medium having a radio frequency transponder

associated therewith. The holder has a holding body to receive and hold the at least one medium, an antenna and a radio frequency communication circuit operable to sense a first electromagnetic field transmitted remotely by a radio frequency read write device and to generate a second electromagnetic field in the holding body with the second electromagnetic field adapted to cause the at least one radio frequency

transponder associated with the at least one medium held by the holding body to respond with at least one third electromagnetic field that can be used to identify the at least one medium within the holding body. The radio frequency communication circuit further transmits a fourth electromagnetic field that can be used to identify the at least one medium within the holding body to the remote radio frequency read write device.

In another aspect of the invention, a medium management system is provided. The medium management system has at least one medium, with each at least one medium having a radio frequency transponder and a holder for holding at least one medium, the holder having a holding body to receive and hold the at least one medium, an antenna; and a radio frequency communication circuit. The radio

frequency communication circuit is operable to sense a first electromagnetic field transmitted by a remote radio frequency read write device, generate a second electromagnetic field in the holding body with the second electromagnetic field adapted to cause the radio frequency transponders associated with at least one

medium held by the holding body to respond with electromagnetic fields that can be used to identify at least one medium within the holding body, wherein the radio frequency communication circuit further transmits electromagnetic fields that can be used to identify at least one medium within the holding body to the remote radio frequency read write device.

In yet another aspect of the invention, a communication circuit is provided for use in a medium management system for managing a set of mediums each medium having a radio frequency transponder with each transponder capable of communication information over a near distance proximate to the transponder. The communication circuit has an antenna; and a radio frequency transceiver joined to the antenna. The radio frequency transceiver is adapted to generate a polling signal causing radio frequency transponders proximate to the communication circuit to generate a responsive signal containing identifying information, said radio frequency transceiver further adapted to receive responses. The radio frequency transceiver is further adapted to generate an information bearing signal for transmission over a distance that is greater than the near distance said information bearing signal providing information from which the medium management system can identify records proximate to the communication circuit.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter of the present invention, it is believed that the invention will be better understood from the following description when taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a schematic block diagram showing an embodiment of a holder of the present invention;

Fig. 2 is another schematic block diagram showing the holder of Fig. 1;

Fig. 3 is a schematic block diagram showing a second embodiment of a holder of the present invention;

Fig. 4 is a schematic block diagram showing the use of the present invention as part of a larger medium management system;

#### **DETAILED DESCRIPTION OF THE INVENTION**

The present invention is directed in particular to elements forming part of, or cooperating more directly with, an apparatus in accordance with the invention.

It is to be understood that elements not specifically shown or described may take various forms well-known to those skilled in the art.

Referring to Figs. 1 and 2, there is shown an embodiment of a holder 10 for holding at least one medium 12, with each medium 12 having a radio frequency transponder 14 associated therewith. In the embodiment shown in Figs. 1 and 2, holder 10 has a holding body 16 to receive and hold the at least one medium 12 with patient related content 36 such as an image, text, graphics, handwriting, or other useful patient information recorded thereon. In the embodiment shown, holder 10 is depicted as comprising a conventional folder type structure. However, in other embodiments, holding body 16 can take other forms, such as a binder, clipboard, encasement, envelope, box, or other such structure.

Holder 10 also has an antenna 18 that can be attached to or formed as part of holding body 16 and a radio frequency communication circuit 20 electrically cooperating with antenna 18 and operable to sense a first electromagnetic field 24 transmitted remotely by a radio frequency read/write device 32. Upon sensing the first electromagnetic field 24, radio frequency communication circuit 20 generates a second electromagnetic field 26. The second electromagnetic field 26 is adapted to cause the at least one radio frequency transponder 14 associated with at least one medium 12 held by holding body 16 to respond with a third electromagnetic field 28 that can be used to identify at least one medium 12 within holding body 16. In one embodiment, second electromagnetic field 26 is adapted for transmission over a near distance. The near distance can be, for example, between 1 cm and 50 cm; however the near distance can be any distance that will ensure that any radio frequency transponder 14 of any medium held within holding body 16 will generate a response.

Third electromagnetic field 28 can contain, for example, a distinguishing document number, patient identification, chronological information, a document descriptor, a condensed or digitally compressed version of the content recorded on the medium, or a complete electronic version of the patient content. Typically, radio frequency transponder 14 associated with medium 12 is capable of transmitting the third electromagnetic field 28 over the near distance. Here too, the near distance can be, for example, between 0.1 cm and 50 cm; however the near distance can be any distance that is appropriate for transmission over a distance that is generally within holding body 16.

Radio frequency communication circuit 20 further transmits a fourth electromagnetic field 30 that can be detected at distances that are greater than the near distance and that can be used to identify holder 10 and at least one medium 12 within holding body 16. This signal can include actual information provided by radio

5 frequency transponder 14 associated with mediums in holding body 16.

Alternatively, this signal can include other information based upon information provided by radio frequency transponder 14. The fourth signal is received by remote radio frequency read/write device 32 and converted into data that is provided to control processing unit 38. Control processing unit 38 processes this data and uses

10 this data to determine what is stored in holding body 16.

Radio frequency communication circuit 20 can be powered remotely by first electromagnetic field 24. Radio frequency communication circuit 20 can then, in turn, power radio frequency transponder 14 using a second electromagnetic field 26. Radio frequency transponder 14 can also be powered by first electromagnetic field 24. Radio frequency communication circuit 20 may be powered by a power source 34 such as a battery within said holding body 16 which can then provide a signal to power radio frequency transponder 14 using an electromagnetic field 22 (not shown).

Fig. 3 shows an alternate embodiment of holder 10 for holding at least one medium 12 in accordance with the present invention. In this embodiment, holder 10 has a holding body 16 to receive and hold at least one medium 12. At least one medium 12 has a radio frequency transponder 14 associated therewith and patient related content 36 recorded thereon. Holding body 16 is also adapted to receive and hold a removable communication medium 40 that is inserted into holder 10.

25 Removable communication medium 40 comprises an antenna 18 that can be attached to or formed as part of the communication medium 40, a radio frequency communication circuit 20 operable to sense a first electromagnetic field 24 transmitted remotely by a radio frequency read/write device 32. Upon sensing the first electromagnetic field 24, radio frequency communication circuit 20 generates a

30 second electromagnetic field 26 in holding body 16 with second electromagnetic field 26 adapted to cause the at least one radio frequency transponder 14 associated with at least one medium 12 held by holding body 16 to respond with a third electromagnetic field 28 that can be used to identify at least one medium 12 within holding body 16.

Radio frequency communication circuit 20 further transmits a fourth electromagnetic field 30 that can be used to identify holder 10 and the at least one medium 12 within holding body 16 to the remote radio frequency read/write device 32 that is in communication with control processing unit 38 for processing  
5 information obtained from holder 10 and at least one medium 12 held within holding body 16.

Radio frequency communication control circuit 20 has a memory 42 adapted to receive, store and maintain log data of at least one medium 12 held by holding body 16. The log data may also be stored and maintained in the remotely  
10 located radio frequency read write device 32. The log data may consist of a listing (not shown) of at least one medium 12 held in holder 10 such that radio frequency communication circuit 20 can compare information identifying at least one medium 12 within holding body 16 against the stored listing 46 of at least one medium 12 to ensure that holder 16 contains a complete set of at least one medium 12 associated  
15 with a patient and that holder 16 does not contain any medium 12 that are not associated with the patient who is associated with holding body 16. Optionally, such log data can also be stored in one or more of the radio frequency transponders 14 associated with medium 12 so that medium 12 held by the holding body 16 can separately provide information from which all medical records associated with the  
20 patient can be determined.

Referring to Fig. 4, a medium management system 50 is shown. In the embodiment shown, medium management system 50 is adapted for use in a controlled access area 62 having a controlled access point 48 to the controlled access area 62 with an access door 66. A remote radio frequency read/write device 32 is located near  
25 the controlled access point 48 that generates a first electromagnetic field 24 to detect and identify holder 10 entering or leaving controlled access area 62. Radio frequency communication circuit 20 is operable to sense first electromagnetic field 24 and to generate a second electromagnetic field 26 in holding body 16. Second electromagnetic field 26 is adapted to cause radio frequency transponders 14 associated with at least one medium 12 held by holding body 16 to respond with a third electromagnetic field 28 to identify at least one medium 12 within holding body  
30 16. Radio frequency communication circuit 20 further transmits a fourth electromagnetic field 30 that can be used to identify the detected holder 54 and at least one medium 12 held by detected holder 54 to the remote radio frequency

read/write device 32. An optional remote radio frequency read/write device 68 may be positioned opposite remote radio frequency read/write device 32 to improve electromagnetic fields being sent and received.

As is also shown in Fig. 4, a personal radio frequency identification transponder 52 can be associated with a person 58 entering or leaving the controlled access area 62. At least one holder 10 sends an electromagnetic field 22 that is received by personal radio frequency identification transponder 52. Personal radio frequency identification transponder 52 responds to electromagnetic field 22 with a signal that can be used to identify person 58. A control-processing unit is provided to communicate with the remote radio frequency read/write device 78, second radio frequency read/write device 70, alarm 56 and network 72 to allow the data from at least one holder 10 and person 58 to be stored remotely, to check permissions, to compare log data and/or to determine who has accessed a particular medium 12 in a particular holder 10 or to sound an alarm 56 or report access or removal of holder 10 to a remote station 74 where person 58 does not have permission to access or remove holder 10. Display 60 can be used to view content within holder 10 or holder 10 could be checked for correct content by a radio frequency read write device shown on file holder 76 within a controlled access area 62 as described previously.

The invention has been described in detail with particular reference to certain preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the scope of the invention as described above, and as noted in the appended claims, by a person of ordinary skill in the art without departing from the scope of the invention.

**PARTS LIST**

- 10 holder
- 12 medium
- 14 radio frequency transponder
- 16 holding body
- 18 antenna
- 20 radio frequency communication circuit
- 22 electromagnetic field
- 24 first electromagnetic field
- 26 second electromagnetic field
- 28 third electromagnetic field
- 30 fourth electromagnetic field
- 32 radio frequency read write device
- 34 power source
- 36 patient related content
- 38 control processing unit
- 40 communication medium
- 42 memory
- 44 log data
- 46 stored listing
- 48 access point
- 50 medium management system
- 52 radio frequency identification transponder
- 54 detected holder
- 56 alarm
- 58 person
- 60 display
- 62 controlled access area
- 64 enclosed area
- 66 access door
- 68 optional radio frequency read write device
- 70 second radio frequency read write device
- 72 network
- 74 remote station

- 76 file holder
- 78 control processing unit